

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Withdrawn) A force-resisting device for transmitting forces and dissipating and absorbing energy across a discontinuous structural element of a structure, the device comprising:

at least one active element, the active element having defined force versus deflection properties, wherein the active element is configured to provide a load path across a discontinuous structural element.

2. (Withdrawn) The force-resisting device according to Claim 1, wherein the active element is configured to be connected to a structure including the discontinuous structural element.

3. (Withdrawn) The force-resisting device according to Claim 1, wherein said force load versus deflection property behaves initially elastic and then changes to plastic under higher applied loads.

4. (Withdrawn) The force-resisting device according to Claim 1, wherein said force load versus deflection property behaves initially elastic, then changes to

plastic under higher applied loads, then changes back to elastic under highest applied loads to limit deflection.

5. (Withdrawn) The force-resisting device according to Claim 1, wherein said force load versus deflection property behaves initially elastic, then becomes progressively more resistant to load via plasticity under higher applied loads, thereby dissipating more energy as forces applied to said active element increase.

6. (Withdrawn) The force-resisting device according to Claim 1, wherein said force load versus deflection property behaves initially elastic, then becomes progressively more resistant to load via combined elasticity and plasticity under higher applied loads, thereby dissipating more energy as forces applied to said active element increase.

7. (Withdrawn) The force-resisting device of Claim 1, wherein the force-resisting device is a building connector spanning a joint, the connector configured to transmit force and dissipate and absorb energy via defined force versus deflection properties.

8. (Withdrawn) A force-resisting device for transmitting forces and dissipating and absorbing energy across a discontinuous structural element of a structure, the device comprising:

at least one active element having at least a first end and a second end, the active element having defined force versus deflection properties and

configured to transmit force and dissipate and absorb energy, wherein the first end of the active element is configured to be connected to a structure; and

at least one frame element disposed about a discontinuous structural element, wherein the frame element is configured to be connected to the second end of the active element, the active element and the frame element are configured to resist forces and reduce stresses and replace stiffness, dissipation, and strength to the structure.

9. (Withdrawn) The force-resisting device according to Claim 8, wherein said frame element comprises at least one active element.

10. (Withdrawn) The force-resisting device according to Claim 8, wherein said discontinuous structural element is an opening and the frame elements are configured to encircle the opening.

11. (Withdrawn) A force-resisting device for transmitting forces and dissipating and absorbing energy across a discontinuous structural element of a structure, the device comprising:

at least one active element having at least a first end and a second end, the active element having defined force versus deflection properties and configured to transmit force and dissipate and absorb energy, wherein the first end of the active element is configured to be connected to a structure; and

at least one frame element configured to be connected to a discontinuous structural element, said frame element configured to be connected to

the second end of the active element, wherein the active element and the frame element are configured to resist forces applied to the structure by transmitting forces across the discontinuous structural element.

12. (Withdrawn) The force-resisting device according to Claim 11, wherein said structure consists of a shear wall.

13. (Withdrawn) The force-resisting device according to Claim 11, wherein said discontinuous structural element consists of an opening.

14. (Withdrawn) The force-resisting device according to Claim 11, wherein said frame element comprises at least one active element.

15. (Withdrawn) The force-resisting device according to Claim 11, wherein one active element is configured to be attached to a structural sill plate.

16. (Withdrawn) A force-resisting device for transmitting forces and dissipating and absorbing energy across a discontinuous structural element of a structure, the device comprising:

at least one active element having at least a first end and a second end, the active element having defined force versus deflection properties and configured to transmit force and dissipate and absorb energy, the first end of the active element configured to be connected to a structure;

at least one reinforcement element, the reinforcement element configured to be connected to a structure; and

at least one frame element configured to be disposed about a discontinuous structural element, wherein the frame element is configured to be connected to the second end of the active element, wherein the active element, the frame element, and the reinforcement element are configured to resist forces applied to the structure by transmitting forces across the discontinuous structural element and are further configured to reduce stresses and replace stiffness, dissipation, and strength to the structure.

17. (Withdrawn) The force-resisting device according to Claim 16, wherein the structure is a shear wall.

18. (Withdrawn) The force-resisting device according to Claim 16, wherein the discontinuous structural element is an opening.

Claims 19 to 21 (Canceled)

22. (Currently Amended) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the active element including a sheet of metal having a non-planar region and the active element having a force versus deflection property under at least one cyclic load,

wherein the force versus deflection property ~~has three regions during a positive portion of the cyclic load and three regions during a negative portion of the cyclic load~~

~~wherein the three regions during the positive portion include two elastic regions and one plastic region and the three regions during the negative portion include two elastic regions and one plastic portion~~ includes an elastic region and a plastic region and wherein, in the plastic region, deflection increases more per unit load than in the elastic region as load increases.

23. (Currently Amended) The force resisting device of claim 22, wherein the a positive portion of the cyclic load is from a neutral force to a maximum positive force.

24. (Currently Amended) The force resisting device of claim 23, wherein the force versus deflection property includes three regions during the positive portion, the three regions including ~~include~~, in order with increasing force, ~~a first the~~ elastic region, ~~a first the~~ plastic region and a second elastic region.

25. (Currently Amended) The force resisting device of claim 22, wherein the a negative portion of the cyclic load is from a maximum positive force to a neutral force.

26. (Currently Amended) The force resisting device of claim 25, wherein the force versus deflection property includes three regions during the negative

portion, the three regions including include, in order with decreasing force, a ~~first~~ second elastic region, ~~a first~~ the plastic region and ~~a first~~ the elastic region.

27. (Currently Amended) The force resisting device of claim 22, wherein a ~~the~~ positive portion of the cyclic load is from a neutral force to a maximum positive force and a ~~the~~ negative portion of the cyclic load is from the maximum positive force to the neutral force.

28. (Currently Amended) The force resisting device of claim 27, wherein the force versus deflection property includes three regions during the positive portion, the three regions including include, in order with increasing force, ~~a first~~ the elastic region, ~~a first~~ the plastic region and a second elastic region and wherein the force versus deflection property includes three regions during the negative portion, the three regions including include the three regions of the positive portion, in opposite order with decreasing force.

29. (Currently Amended) The force resisting device of claim 28, wherein the opposite order of the three regions includes, in order with decreasing force, the second elastic ~~plastic~~ region, the ~~first~~ plastic region and the ~~first~~ elastic region.

30. (Previously Presented) The force resisting device of claim 22, wherein the non-planar region has a v-shape when viewed from a side of the force resisting device.

31. (Currently Amended) The force resisting device of claim 22 30, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

32 (Previously Presented) The force resisting device of claim 22, wherein the force is a shear force.

33. (Currently Amended) A structure incorporating the device of claim 22, wherein the device joins two structural elements with a first portion of the device fixed to a first of the two structural elements and a second portion of the device fixed to a second of the two structural elements, and wherein the first portion and the second portion are co-planar or parallel and the non-planar region is between the first portion and the second portion along a the first dimension

34. (Previously Presented) The structure of claim 33, wherein the non-planar region has a v-shape when viewed in cross-section from a direction perpendicular to the first dimension.

35. (Previously Presented) The structure of claim 34, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

36. (Previously Presented) The structure of claim 33, wherein the two structural elements are two studs in a building panel.

37. (Previously Presented) The structure of claim 33, wherein the two structural elements are a stud and a framing element for an opening in a building panel.

38. (Previously Presented) The structure of claim 33, wherein the two structural elements are a framing element for an opening in a building panel and a sheathing or shear membrane.

39. (Previously Presented) The structure of claim 38, wherein the sheathing or shear membrane is plywood or oriented strand board.

40. (Previously Presented) The structure of claim 38, comprising means for attaching the building panel to an adjacent structure.

41. (Previously Presented) The structure of claim 40, wherein the adjacent structure is a foundation.

42. (Previously Presented) The structure of claim 40, wherein means for attaching transmits forces to the adjacent structure.

43. (Currently Amended) A shear resistant building structure comprising:
a first structural element;
a second structural element; and

at least one active element, the at least one active element including a sheet of metal having a non-planar region and the at least one active element having a force versus deflection property under at least one cyclic load,

wherein the at least one active element joins the two structural elements with a first portion of the active element fixed to a first of the two structural elements and a second portion of the active element fixed to a second of the two structural elements,

wherein the first portion and the second portion are co-planar or parallel and the non-planar region is between the first portion and the second portion along a first dimension,

wherein the force versus deflection property includes an elastic region and a plastic region and wherein, in the plastic region, deflection increases more per unit load than in the elastic region as load increases ~~has three regions during a positive portion of the cyclic load and three regions during a negative portion of the cyclic load, and~~

~~wherein the three regions during the positive portion include two elastic regions and one plastic region and the three regions during the negative portion include two elastic regions and one plastic portion.~~

44. (Previously Presented) The shear resistant building structure of claim 43, wherein the non-planar region has a v-shape when viewed in cross-section from a direction perpendicular to the first dimension.

45. (Previously Presented) The shear resistant building structure of claim 44, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

46. (Previously Presented) The shear resistant building structure of claim 43, wherein the first structural element is a first stud of a wood or metal framed wall portion and the second structural element is a second stud of a wood or metal framed wall portion.

47. (Previously Presented) The shear resistant building structure of claim 43, wherein the two structural elements are a stud of a wood or metal framed wall portion and an opening in a building panel.

48. (Previously Presented) The shear resistant building structure of claim 47, wherein the opening is sized for a window or a door.

49. (Previously Presented) The shear resistant building structure of claim 43, wherein the two structural elements are a framing element for an opening in a building panel and a sheathing or shear membrane.

50. (Previously Presented) The shear resistant building structure of claim 49, wherein the sheathing or shear membrane is plywood or oriented strand board.

51. (Currently Amended) The shear resistant building structure of claim 43, wherein the a positive portion of the cyclic load is from a neutral force to a maximum positive force.

52. (Currently Amended) The shear resistant building structure of claim 51, wherein the force versus deflection property includes three regions during the positive portion, the three regions including ~~include~~, in order with increasing force, a first the elastic region, a first the plastic region and a second elastic region.

53. (Currently Amended) The shear resistant building structure of claim 43, wherein the a negative portion of the cyclic load is from a maximum positive force to a neutral force.

54. (Currently Amended) The shear resistant building structure of claim 53, wherein the force versus deflection property includes three regions during the negative portion, the three regions including ~~include~~, in order with decreasing force, a first second elastic region, a first the plastic region and a second the elastic region.

55. (Currently Amended) The shear resistant building structure of claim 43, wherein the a positive portion of the cyclic load is from a neutral force to a maximum positive force and the a negative portion of the cyclic load is from the maximum positive force to the neutral force.

56. (Currently Amended) The shear resistant building structure of claim 55, wherein the force versus deflection property includes three regions during the positive portion, the three regions including, in order with increasing force, ~~a first~~ the elastic region, ~~a first~~ the plastic region and a second elastic region and wherein the force versus deflection property includes three regions during the negative portion, the three regions including the three regions of the positive portion, in opposite order with decreasing force.

57. (Currently Amended) The shear resistant building structure of claim 56, wherein the opposite order of the three regions includes, in order with decreasing force, the second ~~plastic~~ elastic region, the first plastic region and the first elastic region.

58. (Previously Presented) The shear resistant building structure of claim 43, wherein the non-planar region has a v-shape when viewed from a side of the force resisting device.

59. (Previously Presented) The shear resistant building structure of claim 58, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

60. (Previously Presented) The shear resistant building structure of claim 43, wherein the force is a shear force.

61. (Previously Presented) The shear resistant building structure of claim 43, comprising means for attaching at least one of the first structural element and the second structural element to an adjacent structure.

62. (Previously Presented) The shear resistant building structure of claim 43, wherein the adjacent structure is a foundation.

63. (Previously Presented) A building including the shear resistant building structure of any one of claims 43 to 62.

Claims 64-77 (Canceled)

78. (Withdrawn) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the active element having two in-plane regions and one out-of-plane region,

wherein the active element has a force versus deflection property over building code required loads of only elastic behavior and plastic behavior.

79. (Withdrawn) The force resisting device of claim 78, wherein the out-of-plane region has a v-shape when viewed from a side of the force resisting device.

80. (Withdrawn) The force resisting device of claim 79, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

81. (Withdrawn) The force resisting device of claim 78, wherein the force is a shear force.

82. (Withdrawn) The force resisting device of claim 78, wherein the code required loads include seismic loads.

83. (Withdrawn) The force resisting device of claim 78, wherein the code required loads include wind loads

84. (Withdrawn) A structure incorporating the device of claim 78, wherein the active element joins two structural elements with a first of the two in-plane regions fixed to a first of the two structural elements and a second of the two in-plane regions of the active element fixed to a second of the two structural elements

85. (Withdrawn) The structure of claim 84, wherein the first of the two in-plane regions and the second of the two in-plane regions are co-planar and the out-of-plane region is between the first region and the second.

86. (Withdrawn) The structure of claim 84, wherein the two structural elements are a framing element for an opening in a building panel and a sheathing or shear membrane.

87. (Withdrawn) The structure of claim 86, wherein the sheathing or shear membrane is plywood or oriented strand board.

88. (Withdrawn) The structure of claim 84, comprising means for attaching at least one of the two structural elements to an adjacent structure.

89. (Withdrawn) The structure of claim 88, wherein the adjacent structure is a foundation.

90. (Withdrawn) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the active element having two in-plane regions and one out-of-plane region,

wherein the active element is only elastoplastic over a deflection distance mandated by an uniform building code.

91. (Withdrawn) The force resisting device of claim 90, wherein the deflection distance is two inches.

92. (Withdrawn) The force resisting device of claim 90, wherein the out-of-plane region has a v-shape when viewed from a side of the force resisting device.

93. (Withdrawn) The force resisting device of claim 90, wherein the v-shape is non-symmetric about a bisector of an apex of the v-shape.

94. (Withdrawn) The force resisting device of claim 90, wherein the force is a shear force.

95. (Withdrawn) A structure incorporating the device of claim 90, wherein the active element joins two structural elements with a first of the two in-plane regions fixed to a first of the two structural elements and a second of the two in-plane regions of the active element fixed to a second of the two structural elements.

96. (Withdrawn) The structure of claim 95, wherein the first of the two in-plane regions and the second of the two in-plane regions are co-planar and the out-of-plane region is between the first region and the second.

97. (Withdrawn) The structure of claim 95, wherein the two structural elements are a framing element for an opening in a building panel and a sheathing or shear membrane.

98. (Withdrawn) The structure of claim 97, wherein the sheathing or shear membrane is plywood or oriented strand board

99. (Withdrawn) The structure of claim 95, comprising means for attaching at least one of the two structural elements to an adjacent structure.

100. (Withdrawn) The structure of claim 99, wherein the adjacent structure is a foundation.

Claims 101-135 (Canceled)

136. (New) The force resisting device of claim 22, wherein the sheet of metal has two or more non-planar regions oriented in parallel relationship to each other.

137. (New) The force resisting device of claim 22, wherein apertures are disposed through the sheet of metal adjacent to the active element.

138. (New) The force resisting device of claim 22, wherein a first end of the active element is configured to connect to a building structure and a second end of the active element is configured to connect to a frame element.

139. (New) The force resisting device of claim 22, wherein the active element is a single component formed by the sheet of metal.

140. (New) The force resisting device of claim 22, wherein at least one aperture is disposed through the non-planar region.

141. (New) The structure of claim 33, wherein the first dimension is in a load path of the structure.

142. (New) The structure of claim 33, wherein the sheet of metal has two or more non-planar regions oriented in parallel relationship to each other.

143. (New) The structure of claim 142, wherein the two or more non-planar regions are oriented substantially parallel to the first dimension.

144. (New) The structure of claim 33, wherein apertures are disposed through the sheet of metal adjacent to the active element.

145. (New) The structure of claim 33, wherein a first end of the active element is configured to connect to a building structure and a second end of the active element is configured to connect to a frame element.

146. (New) The structure of claim 33, wherein the active element is a single component formed by the sheet of metal.

147 (New) The structure of claim 34, wherein the non-planar region has a truncated v-shape when viewed in cross-section from a direction perpendicular to the first dimension.

148. (New) The force resisting device of claim 33, wherein at least one aperture is disposed through the non-planar region.

149. (New) The shear resistant building structure of claim 43, wherein the sheet of metal has two or more non-planar regions oriented in parallel relationship to each other.

150. (New) The shear resistant building structure of claim 43, wherein apertures are disposed through the sheet of metal adjacent to the active element.

151. (New) The shear resistant building structure of claim 43, wherein a first end of the active element is configured to connect to a building structure and a second end of the active element is configured to connect to a frame element.

152. (New) The shear resistant building structure of claim 43, wherein the active element is a single component formed by the sheet of metal.

153. (New) The force resisting device of claim 43, wherein at least one aperture is disposed through the non-planar region.

154. (New) The shear resistant building structure of claim 44, wherein the non-planar region has a truncated v-shape when viewed in cross-section from a direction perpendicular to the first dimension.

155. (New) A building including the shear resistant building structure of claim 43, wherein the first dimension is in a load path of the structure.

156. (New) The building of claim 155, wherein the sheet of metal has two or more non-planar regions oriented in parallel relationship to each other.

157. (New) The building of claim 155, wherein the two or more non-planar regions are oriented substantially parallel to the first dimension.

158. (New) The building of claim 155, wherein apertures are disposed through the sheet of metal adjacent to the active element.

159. (New) The building of claim 155, wherein a first end of the active element is configured to connect to a building structure and a second end of the active element is configured to connect to a frame element.

160. (New) The building of claim 155, wherein the active element is a single component formed by the sheet of metal.

161. (New) The structure of claim 34, wherein the v-shape non-planar region has at least two portions, the first portion at a different location along a length direction of the v-shape non-planar region than the second portion, and wherein the first portion expands when the second portion contracts.

162. (New) The shear resistant building structure of claim 44, wherein the v-shape non-planar region has at least two portions, the first portion at a different

location along a length direction of the v-shape non-planar region than the second portion, and wherein the first portion expands when the second portion contracts.

163. (New) The shear resistant building structure of claim 58, wherein the v-shape non-planar region has at least two portions, the first portion at a different location along a length direction of the v-shape non-planar region than the second portion, and wherein the first portion expands when the second portion contracts.

164. (New) The structure of claim 34, wherein vertical portions of shear loads applied to the structure tend to rotate an axis of the v-shape non-planar region relative to edges of the active element

165. (New) The structure of claim 164, wherein the rotation reverses under cyclic loads.

166. (New) The shear resistant building structure of claim 44, wherein vertical portions of shear loads applied to the structure tend to rotate an axis of the v-shape non-planar region relative to edges of the active element

167. (New) The shear resistant building structure of claim 166, wherein the rotation reverses under cyclic loads.

168. (New) The shear resistant building structure of claim 58, wherein vertical portions of shear loads applied to the structure tend to rotate an axis of the v-shape non-planar region relative to edges of the active element

169. (New) The shear resistant building structure of claim 168, wherein the rotation reverses under cyclic loads.

170. (New) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the at least one active element including a sheet of metal having a non-planar region and the at least one active element having a force versus deflection property under at least one cyclic load,

wherein the force versus deflection property is elastic in a first range of forces and is plastic in a second range of forces, the second range of forces greater than the first range of forces, and

wherein in the second range of forces, deflection increase more per unit load than in the first range of forces.

171. (New) A shear resistant building structure comprising:

a first structural element;

a second structural element; and

at least one active element, the active element including a sheet of metal having a non-planar region and the active element having a force versus deflection property under at least one cyclic load,

wherein the active element joins the two structural elements with a first portion of the active element fixed to a first of the two structural elements and a second portion of the active element fixed to a second of the two structural elements,

wherein the first portion and the second portion are co-planar or parallel and the non-planar region is between the first portion and the second portion along a first dimension,

wherein the force versus deflection property is elastic in a first range of forces and is plastic in a second range of forces, the second range of forces greater than the first range of forces, and

wherein in the second range of forces, deflection increase more per unit load than in the first range of forces.

172. (New) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the active element including a sheet formed from an engineered plastic or an engineered composite material having a non-planar region and the active element having a force versus deflection property under at least one cyclic load,

wherein the force versus deflection property includes an elastic region and a plastic region and wherein, in the plastic region, deflection increases more per unit load than in the elastic region as load increases.

173. (New) A shear resistant building structure comprising:

a first structural element;

a second structural element; and

at least one active element, the at least one active element including a sheet formed from an engineered plastic or an engineered composite material having a non-planar region and the at least one active element having a force versus deflection property under at least one cyclic load,

wherein the at least one active element joins the two structural elements with a first portion of the active element fixed to a first of the two structural elements and a second portion of the active element fixed to a second of the two structural elements,

wherein the first portion and the second portion are co-planar or parallel and the non-planar region is between the first portion and the second portion along a first dimension, and

wherein the force versus deflection property includes an elastic region and a plastic region and wherein, in the plastic region, deflection increases more per unit load than in the elastic region as load increases.

174. (New) A force resisting device for transmitting forces and dissipating and absorbing energy, the device comprising:

at least one active element, the at least one active element including a sheet formed from an engineered plastic or an engineered composite material having a non-planar region and the at least one active element having a force versus deflection property under at least one cyclic load,

wherein the force versus deflection property is elastic in a first range of forces and is plastic in a second range of forces, the second range of forces greater than the first range of forces, and

wherein in the second range of forces, deflection increase more per unit load than in the first range of forces.

175. (New) A shear resistant building structure comprising:

a first structural element;

a second structural element; and

at least one active element, the active element including a sheet formed from an engineered plastic or an engineered composite material having a non-planar region and having a force versus deflection property under at least one cyclic load,

wherein the at least one active element joins the two structural elements with a first portion of the active element fixed to a first of the two structural elements and a second portion of the active element fixed to a second of the two structural elements,

wherein the first portion and the second portion are co-planar or parallel and the non-planar region is between the first portion and the second portion along a first dimension,

wherein the force versus deflection property is elastic in a first range of forces and is plastic in a second range of forces, the second range of forces greater than the first range of forces, and

wherein in the second range of forces, deflection increase more per unit load than in the first range of forces.